WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2005AK45B

Title: Characterizing sources and growth potential of indicator bacteria in cold region streams

Project Type: Research

Focus Category: Water Quality

Keywords: source tracking, fecal coliform, antibiotic resistance, indicator bacteria

Start Date: 03/01/2005

End Date: 06/01/2006

Federal Funds: $19,960

Non-Federal Matching Funds: $41,549

Congressional District:

Principal Investigator:
William Schnabel

Abstract

Fecal coliform (FC) bacteria are the most prevalent contaminant in urbanized Alaskan surface waters. Currently, a significant amount of scientific and regulatory effort is underway to better monitor and understand the distribution of FC bacteria in a number of impacted waterways. This study seeks to escalate that effort through the adaptation and implementation of Antibiotic Resistance Analysis, a cost-effective method for distinguishing FC source organisms in surface waters. This distinction will allow managers to more accurately assess potential source vectors (e.g., leaking sewers,waterfowl ponds, etc.) and ultimately develop mitigation measures appropriate to the source. In the analysis, bacteria of known origin will be cultured and subjected to an array of antibiotics. As bacteria originating from different species will result in differential resistances to antibiotics, discriminant variables will be derived from the known cultures that can serve to identify the source of unknown cultures. In addition to the antibiotic resistance analysis, this study intends to employ a coliform growth response bioassay in order to better characterize the capacity of surface waters to promote instream growth of indicator organisms. The bioassay will entail culturing Enterobacter cloacae in sterilized stream water. Growth of the culture after five days will be used as a measure of assimilable organic carbon, which in turn indicates the potential for streams to promote

FC growth. This effort is designed to aid in the interpretation of monitoring results, as the extent of in-stream FC reproduction in cold regions is currently unclear. Finally, as the aforementioned activities will allow for more accurate identification of FC source areas and in-stream decay coefficients, this study intends to use the new data to refine a current FC modeling effort for an Anchorage area stream.